

AMENDMENT TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Please amend the claims as follows:

Claim 1 (Currently Amended). A plasma-assisted deposition method for forming an insulating film on a substrate placed on a support device in an airtight processing vessel by activating C₅F₈ gas by a plasma forming gas, the method using a plasma-assisted deposition system and comprising:

guiding a microwave guided by a wave guide to a flat antenna member disposed opposite to the support device;

radiating the microwave from a plurality of slots in a circumferential arrangement in the flat antenna member made of conducting material;

supplying the plasma forming gas, including a rare gas, into the airtight processing vessel with a plasma forming gas discharge head disposed between the flat antenna member and the support device;

supplying the C₅F₈ gas into the airtight processing vessel with a C₅F₈ gas discharge head disposed between the plasma forming gas discharge head and the support device, while conducting the plasma forming gas vertically through a plurality of through holes in the C₅F₈ gas discharge head;

providing an electron temperature of 2 eV or below and an electron density of 5x10¹¹ electrons per cubic centimeter or above in a space extending between C₅F₈ gas supply openings in the C₅F₈ gas discharge head and a surface of the substrate;

providing a processing atmosphere pressure of 19.95 Pa or below; and

depositing on the substrate the insulating film which is a fluorine-containing carbon film having a relative dielectric constant of 2.3 or below and a leakage current of 5×10^{-8} A/cm² or below.

Claim 2 (Cancelled).

Claim 3 (Previously Presented). The plasma-assisted deposition method according to claim 1, wherein the slots have a length between half the wavelength of the microwave at the side of the waveguide with respect to the flat antenna member and half the wavelength of the microwave at the side of the plasma producing space with respect to the flat antenna member.

Claim 4 (Previously Presented). The plasma-assisted deposition method according to claim 1, wherein the plurality of slots are arranged on concentric circles having their centers at the center of the flat antenna member or on a spiral around the center of the flat antenna member.

Claim 5 (Previously Presented). The plasma-assisted deposition method according to claim 1, wherein the microwave radiated from the flat antenna member is a circularly polarized wave or a linearly polarized wave.

Claims 6-8 (Cancelled).

Claim 9 (Withdrawn). A plasma-assisted deposition system comprising:

an airtight processing vessel internally provided with a support device for supporting a substrate thereon;

a C₅F₈ gas supply system for supplying C₅F₈ gas for forming an insulating film on the substrate into the processing vessel;

a microwave generator for generating a microwave for activating the C₅F₈ gas to produce a plasma;

a waveguide for guiding the microwave generated by the microwave generator into the processing vessel; and

a flat antenna member connected to the waveguide, disposed opposite to the support device and provided with a plurality of slots formed therein in a circumferential arrangement;

characterized in that C_5F_8 gas is activated by the plasma, a space extending between C_5F_8 gas supply openings and a surface of the substrate has an electron temperature of 2 eV or below and an electron density of 5×10^{11} electrons per cubic centimeter or above, a processing atmosphere has a process pressure of 19.95 Pa or below, and a fluorine-containing carbon film deposited by a film deposition process on the substrate placed on the support device has a relative dielectric constant of 2.3 or below and permits a leakage current of 5×10^{-8} A/cm² or below.

Claim 10 (Withdrawn). The plasma-assisted deposition method according to claim 9, wherein the slots have a length between half the wavelength of the microwave at the side of the waveguide with respect to the flat antenna member and half the wavelength of the microwave at the side of the plasma producing space with respect to the flat antenna member.

Claim 11 (Withdrawn). The plasma-assisted deposition system according to claim 10, wherein the plurality of slots are arranged on concentric circles having their centers at the center of the flat antenna member or on a spiral around the center of the flat antenna member.

Claim 12 (Withdrawn). The plasma-assisted deposition system according to any one of claims 9 to 11, wherein the microwave radiated from the flat antenna member is a circularly polarized wave or a linearly polarized wave.

Claims 13-14 (Canceled).